



21st Century reform in Australian coastal policy and legislation

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ABSTRACT

Recent coastal legislative and policy reform in Australia reflects the changing focus of coastal management studies in the international scientific literature indicating a move towards systems perspectives, cross-boundary management strategies and an integration of marine and terrestrial environments. Significant global and national reports on integrated coastal management and climate change set the stage for a 21st Century wave of coastal reform in Australia. Given the absence of Australian national coastal legislation or coastal policy the reforms were initiated by a number of state governments such as in New South Wales and Victoria where new pieces of state-based coastal legislation came into law in 2018. This paper examines new coastal legislation, policies, manuals, and government documents and the rationale and triggers behind these reforms. These are discussed in the context of Australian governance structures and the international coastal management literature. The paper concludes that the latest wave of coastal reform in Australia represents a non-uniform stateled push for a more integrated approach to coastal management including, adaptation to climate change, sustainable development, a systems-based approach to coastal processes and inclusion of both marine and terrestrial environments.

1. Introduction

Coastal management has evolved globally since coastal zone management (CZM) legislation was first introduced to the United States (US) in 1972. In a recent study of 5461 references on coastal management theory and practice from the scientific literature, Birch and Reyes [1] identify phases in the evolution of CZM from 1975 to 2014 and conclude that as a discipline it is now focusing more on systems perspectives, cross-boundary management strategies and a consideration of both marine and terrestrial environments. They note that the emergence of CZM in the scientific literature began soon after the US *Coastal Zone Management Act 1972* (CZMA) with an initial focus on land use and legal aspects but subsequently there were significant increases in the volume of publications after major policy initiatives such as *Agenda21* [1]. They comment that there has been a notable shift from the use of ‘coastal zone management’ to ‘integrated coastal management’ (ICM).

Reasons for a change in the focus of ICM over time relate to both external and internal influences within various jurisdictions. Important external influences such as *Agenda21* or the assessment reports of the *Intergovernmental Panel on Climate Change* [2] do not automatically create reforms in coastal legislation or policy but may result in quite different responses both between and within countries. In part this may relate to the significance of specific issues for the relevant jurisdiction but will also depend on internal politics, and governance structures. According to Birch and Reyes [1] the US, the United Kingdom (UK) and

Australia are countries with the most prolific number of coastal management publications. It should be noted, however, that the US and the UK have quite different governance structures and legislative mechanisms that influenced the nature of or pattern of change or reform to their coastal management policy, legislation and practice over time.

The US and Australia both have a federated governance structure and a significant coastal management role for state authorities but unlike the US, Australia has no federal coastal management legislation. The US CZMA relies on individual states to voluntarily develop their own coastal zone management programs in collaboration with federal and local governments. The scheme has worked very well largely because of federal financial incentives and assistance plus the commitment that federal government actions will be consistent with approved state programs [3]. During its evolution the US CZMA has been subject to a number of internal legal challenges and political pressures which almost caused the loss of the programs during the 1980s [4]. Ultimately the legislation was rescued and strengthened by reforms through the enactment of the 1990 *Coastal Zone Act Reauthorization Amendments* (CZARA) [4,5]. According to Kitsos et al. [4] the US coastal management program is currently in a reasonably stable state even though it has recently had wavering political support and is underfunded.

The UK government has no national coastal legislation but has facilitated the production of national guidelines on coastal planning policy and reports on issues such as coastal heritage [3]. There is also a complex mix of coastal strategies and plans administered largely by county, district and local councils. At the national level, the UK

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Environment Agency has overall responsibility for a strategic overview of coastal management by working with local authorities and other coastal bodies to develop a consistent approach on managing coastal risks [6]. Of particular relevance is the system of non-statutory shoreline management plans based on 22 sections or sediment compartments/cells of the UK coast. In addition to UK governance structures, the country is also subject to European Union (EU) recommendations on coastal management. Hewett and Fletcher [7] clarify that since the early 1990s the EU has embraced ICM as a reform agenda whereas there is still no formal ICM framework for the UK despite national ICM strategies.

In Australia coastal management is largely the responsibility of the eight separate states and territories [8] and is unique because in this federated state system the federal government has no coastal legislation or national coastal policy and has not been a leader in coastal matters [9]. Under the Australian constitution, responsibility for land use is vested with the state governments which regulate the use of coastal resources, coastal planning and development, and coastal management. State governments in turn delegate many coastal management responsibilities to local government [8].

This paper focuses on the recent wave of 21st Century reform in Australian coastal management by analyzing the new pieces of coastal legislation, policies, manuals and government documents in order to examine the rationale and triggers for these reforms. These are discussed in a broader international context. The paper concludes that the latest wave of coastal reform in Australia represents a non-uniform state-led push for a more integrated approach to coastal management, including, climate change, sustainable development, systems perspectives and inclusion of both marine and terrestrial environments.

Australian coastal management has undergone a number of reforms in response to policy initiatives such as *Agenda21* and the various IPCC reports, but these reforms have largely occurred at the state level and lack national consistency. The 20th Century evolution of coastal management in Australia has been dealt with elsewhere [10,11] and is used here to provide a context for the most recent reforms.

2. Australian 20th Century coastal management reform

Severe erosion in the 1950s and 1960s caused significant damage to coastal infrastructure where Australian urban development had been built too close to the coast. This led to the first wave in the evolution of coastal management where a largely sectoral approach resulted in new coast protection legislation being created in the states of Queensland (QLD), South Australia (SA) and New South Wales (NSW) as shown in Table 1. As noted by Thom and Harvey [11] there were four key triggers for late 20th Century reform of Australian coastal management including;

- 1) climate change,
- 2) sustainable development,
- 3) integrated management, and
- 4) community participation.

A combination of these and other factors led to a wave of reform in the 1990s (Table 1) although ‘community participation’ is not included as a major influence on policy and legislative change. All of these reforms can be largely attributed to external influences such as the IPCC assessment reports [12] and *Agenda21* [13] which collectively pushed for an integrated approach to coastal and marine management incorporating impacts of climate change. These international influences were strengthened by the outcomes of a national parliamentary coastal inquiry (Resource Assessment Commission, 1993).

The major reforms included the introduction of new holistic coastal management legislation in QLD and Victoria (VIC) in 1995, significant amendments to the NSW coastal policy in 1994 and the introduction of a state-wide statutory coastal policy in Tasmania (TAS) in 1996. The introduction of the SA policy on sea-level rise, including development set-back benchmarks, in 1991 was not emulated by other states for at least the next 15 years. The Commonwealth Government introduced a short-lived Coastal Policy (1995) that related only to Commonwealth actions.

It should be noted that the Northern Territory (NT) is somewhat unique because, although it has no state-wide coastal legislation or strategy, over 80% of its coastline is under Aboriginal ownership and management. An important Australian High Court ‘Blue Mud Bay’ decision in 2008 confirmed that Aboriginal land extends to the low water mark, and permission of the traditional owners is needed to access waters over the intertidal zone of existing Aboriginal land grants. The result has been various active management strategies by traditional owners which reflect the unique heritage and cultural aspects of this part of the coast.

By the end of the 20th Century, state-based coastal management in Australian was highly varied. Only four states had specific pieces of coastal legislation (QLD *Coastal Protection and Management Act 1995*; NSW *Coastal Protection Act 1979*; SA *Coast Protection Act 1972*; and VIC *Coastal Management Act 1995*) but most states had coastal policies or strategies linked to various pieces of planning and development control legislation [14]. The policies varied from non-statutory guidelines through to statutory state-wide policies.

Unlike countries such as Canada which has an *Oceans Act 1996*, Australia has a land-based development control focus to coastal management with limited integration of ocean or marine management. Although marine protected areas (MPAs) are not within the remit of this paper it has been argued that MPAs should be part of an integrated coastal and ocean management system [15]. Australia has a comprehensive national system of MPAs based on bioregions to define

Table 1
Evolution of coastal management in Australia up to 2009.

period	External influence: Impetus for change	Reforms: Policy/legislation or key reports
1950s-60s	severe ‘coastal erosion’	1968 QLD, New coast protection legislation 1972 SA, New coast protection legislation 1979 NSW New coast protection legislation
1990s	1990 IPCC FAR ‘climate change’ 1990–1994 IPCC coastal sub-group ‘sustainable development’ and ‘integrated coastal management’ 1992 Rio/Earth Summit 1992 Australian ESD strategy 1993 Australian Coastal Zone Inquiry	1991 Sea-level rise policy SA, 1995 QLD, New coastal legislation 1995 VIC New coastal legislation 1995 Commonwealth coastal policy 1994 Amended coastal policy NSW 1996 New coastal policy TAS
2000s	2002 Jo’burg/Earth Summit, ‘integrated coastal management’ (ICM) and ‘coastal adaptation to climate change’ (CACC) 2001 IPCC TAR 2007 IPCC 4AR 2004 Australian ‘seachange’ population movement	2006 National Approach to ICZM 2009 National Coastal Vulnerability Assessment 2009 National parliamentary inquiry into coastal management and climate change

representative areas. This is discussed by Harvey and Caton (2003, pages 174–180) in the context of Australian coastal management. Individual states have also developed their own MPA system and some of the reforms discussed later in this paper illustrate attempts to link coastal and marine management.

The next evolutionary step in Australian coastal management was recognition of the need for a national approach to integrated coastal zone management in response to the consistent message from IPCC and the UN about the need for an integrated approach to coastal management incorporating climate change. State and federal Government action was motivated by Australian non-metropolitan coastal local governments feeling the strain of increasing population and coastal development pressures. The response was the production of three influential national reports in the early 2000s.

The first report was a collaborative agreement between the federal and state governments setting out the principles for an integrated approach to coastal management [16] but the initiative was not resourced and lacked follow up implementation. The second report came from a 2009 major bi-partisan parliamentary inquiry which produced a comprehensive document dealing with the management of the coast under climate change [17] but there was limited political response to its recommendations. The third report, also produced in 2009, by the Australian government, was the first national coastal vulnerability assessment for climate change [18]. This report was probably the most influential in raising awareness of coastal vulnerability, particularly for state and local governments.

While these reports didn't produce any immediate response, they did set the stage for a 21st Century wave of coastal legislative and policy reform. The main focus of this paper is the significant change to coastal management in Australia between 2010 and 2019.

3. A new wave of reform for Australian 21st Century coastal management

As noted above, four Australian states have dedicated coastal legislation. Three of these (QLD, NSW and VIC) recently initiated significant coastal policy reform. Western Australia (WA), which has coastal management as part of its planning legislation has also experienced significant change. Two states (NSW and VIC) repealed their existing coastal legislation replacing it with entirely new legislation. Both pieces of legislation came into effect in 2018. These policy and legislative reforms are outlined below roughly in chronological order of their implementation.

3.1. Western Australia coastal policy reform

Western Australia is one of the states without dedicated coastal legislation. As part of its *Planning and Development Act 2005* it has a *State Coastal Planning Policy*. While state planning policies (SPPs) under this legislation are not binding on every planning decision there is a requirement to take them into regard in the preparation of local planning schemes. The policy was significantly revised and expanded in scope in 2013 replacing the original 2003 coastal SPP.

The 2013 coastal SPP reforms provided greater guidance on coastal hazards with the inclusion of risk management and adaption planning, coast protection works and the precautionary principle [19]. To help identify potential areas of coastal erosion and inundation, and public and private assets at risk to coastal hazards and to assist in the development of adaption strategies for reducing hazard risk the coastal SPP adopts a process of coastal hazard risk management and adaption planning (CHRMAP), which also has a set policy and guidelines (2014) [19].

The revised 2013 SPP and its associated guidelines indicate a policy response to various international reports on climate change and sustainable development. In allowing for sea-level rise the SPP requires disclosure of any identified vulnerable coastal area for coastal

development proposals/*Schedule 1* of the SPP specifies a hierarchy of adaptation with coastal protection being the last option. It also adopts a decision-making approach based on 'sediment cells' or 'coastal compartments' whereby consideration is given to different types of coastal landforms and processes within a whole system (a cell or compartment).

3.2. Queensland coastal policy reform

The *QLD Coastal Protection and Management Act 1995* has not been significantly altered since its enactment but between 2012 and 2017 there has been a rapid cycle of coastal reform following changes of government. An oscillation of state-government political ideologies created a period of instability in QLD coastal management.

Warnkin and Mosedeghi [20] discuss the problems of implementing ICM in QLD's local planning system and discuss the evolution of coastal management in that state from 1995 onwards. In particular, they provide useful insights into the linkages between coastal legislation and coastal policy through the various QLD planning instruments and discuss how the linkages between these have changed over time.

The *QLD Coastal Protection and Management Act 1995* has three main instruments to achieve its coast protection and management objectives; 1) it provides for the development of coastal management plans to set state coastal management principles and policies; 2) it allows for the declaration of coastal management districts (CMDs) which require special controls; and 3) it provides for the use of other legislation to achieve the objectives of the Act.

In 2012 a new QLD Coastal Plan was introduced to include both a state coastal policy under the *Coastal Protection and Management Act 1995* plus a state planning policy (SPP) for coast protection under the *Sustainability Planning Act 2009*. QLD local government, which had the onus of preparing complex coastal hazard adaptation strategies, raised concern about the Plan. A change of state government in 2012, raised new concerns about the Plan's perceived restriction on coastal development. For this reason, the incoming government initiated a review of the Plan, suspended the coastal SPP and replaced it with draft coastal regulatory provisions. In this process, according to Warnkin and Mosedeghi [20] the state government removed all references to climate change impacts and most statutory requirements for climate change adaptation in coastal areas. Simultaneously, there was what appears to have been a rushed attempt to modify references to climate change in the *QLD Coastal Hazard Technical Guide* released in 2013. In 2014 the government released its reformed Coastal Plan which was no longer a statutory document and was more akin to a coastal management guidelines manual.

In 2015 a new state government began to reinstate climate-related coastal adaptation mechanisms. Its reforms were introduced in a number of ways. In 2016 the QLD government introduced a climate change strategy and also revamped its state Planning Act to make the Act more flexible for local government. It restored key elements in the *Coastal Protection and Management Act 1995* namely the use of a sea-level rise benchmark into coastal management districts and erosion prone area mapping. After lobbying by the Local Government Association of QLD, the state government, in 2016, launched an AU\$12 million *Qcoast2100* program to provide financial assistance to local government in the preparation of their local hazard strategies.

Thus, coastal reform in QLD has been through a see-sawing implementation phase because of changes in state government. The result is that by 2016 climate change coastal adaption, including sea-level rise benchmarks, has been restored. Unfortunately, this represents only one of the original three key instruments of the coastal legislation. According to Warnkin and Mosedeghi [20] the remaining two instruments no longer have a strong, state-wide focus on coastal management and protection because they have been subsumed by other legislative changes in planning.

3.3. New South Wales coastal management reform

The introduction of the *Coastal Protection Act 1979* and subsequent evolution of coastal management in NSW up to 2010 has been detailed by Lipman and Stokes [21] with a focus on its legal aspects. In 2009 in response to IPCC global climate change predictions the NSW government released its sea-level rise policy statement, including sea-level rise benchmarks. According to O'Donnell and Gates [22] the implementation of this reform proved problematic because the policy lacked statutory force, didn't give local government enough support for adaptation and left the decision-makers open to litigation. Another problem related to the protection of private property [14] which was the subject of new regulations around emergency protection works. Subsequently, in 2012, the state-wide sea-level rise benchmark requirements were revoked to allow local government flexibility in planning and to modify the regulations on protective works [22].

According to Thom [23], referring to the state government initiated major coastal reform process in 2012, there was little doubt of the need for reform of the NSW coastal legislation, policies and guidance documents. The process involved teams from NSW government departments, assisted by a coastal expert panel. This very formal review, the *Stage 2 Coastal Reform* was subject to public and political scrutiny [24].

The first major outcome of the *Stage 2 Coastal Reform* process was the passing of new legislation, the *NSW Coastal Management Act 2016*. However, to provide a coordinated approach between coastal management and planning legislation a number of other critical coastal management instruments were needed prior to its enactment. In 2016 the NSW government also announced a funding package of AU\$83.6 million for Coastal Management from 2016–17 to 2020–21, including a Coastal and Estuary Grants Program. The grants program was a key instrument of coastal reform to provide assistance, particularly to local government, in developing coastal management programs (CMPs). In 2018, three other key instruments of the coastal reforms were delivered. Under the *Environment Planning and Assessment Act 1979* a State Environmental Planning Policy (Coastal Management), referred to as the coastal SEPP, was approved; a new and comprehensive Coastal Manual was released to provide guidelines on an integrated approach for coastal management including both mandatory requirements and guidance tools to help local government prepare their CMPs; and a new advisory Coastal Council was appointed. Once these five key coastal management instruments had been approved, the new *Coastal Management Act 2016* took effect on 3 April 2018.

The new NSW coastal management system is unique in a number of ways. The Act has 13 objects which *inter alia* include a sustainable and integrated approach to coastal management in order to mitigate risks from coastal hazards, including the effects of climate change. A new focus is provided by the final object which is 'to support the object of the *Marine Estate Management Act 2014*' in a clear push to provide better integration across the coastal and marine continuum. The definitions section of the Act sub-divide 'coastal hazards' into seven different categories. Part 2 of the Act defines four clearly delineated coastal areas; 1) coastal wetlands and littoral rainforests area; 2) coastal vulnerability area, 3) coastal environment area; and 4) a coastal use area. These four areas are linked to specific development controls in the planning legislation through the coastal SEPP.

An important element in the NSW coastal reforms is the 1918 Coastal Manual which has mandatory requirements for councils in preparing and monitoring CMPs linked to an integrated planning system under the *Environment Planning and Assessment Act 1979*. In particular, Part B of the manual addresses the determination of coastal risks, vulnerabilities and opportunities. As noted above the Coastal and Estuary Grants Program is important in assisting the preparation of these CMPs. Another important element of reform is the creation of the NSW Coastal Council, which advises the Planning Minister but also has a role in monitoring and auditing the CMPs.

One of the more innovative reforms introduced to the NSW coastal

legislation is perhaps the inclusion of sediment compartments (see Ref. [25] in Schedule 1 of the Act, similar to the WA planning guidelines. These compartments have to be taken into account by local government in their preparation of CMPs. This requirement, in some ways avoids previous problems with piecemeal and *ad hoc* private protection and application of state-wide sea-level rise benchmarks by adopting a more holistic and integrated approach to coastal management.

3.4. Victorian coastal management reform

The Victorian coastal management system under the *Coastal Management Act 1995* with linkages to the *VIC Planning and Environment Act 1987* has been described by Harvey [10]. The Act prescribes a state-wide Victorian Coastal Strategy, the latest version of which (2014) is still in force. In 2012 the VIC state government also released a *Coastal Hazard Guide* to improve understanding and raise awareness of the effect that climate change may have on these hazards.

The Victorian coast is unique in that 96% is public land managed by the state through the Department of Environment, Land, Water and Planning (DELWP). The majority of this 96% is managed by Parks Victoria. For this reason, the VIC National Parks Association (VNPA) has been a strong lobby group for reform in coastal management. Its influential report on conservation priorities for VIC contained a major chapter on the coastal environment arguing *inter alia* for a more comprehensive, adequate and representative protection of coastal and marine ecosystems [26].

In late 2014 a new government was elected in Victoria which honored its election promises by starting a coastal reform process in 2015. It released a public discussion paper in 2016 outlining proposed legislative changes and in August 2018 the government had successfully enacted new coastal legislation, the *Marine and Coastal Act 2018*. Its companion *Coastal Policy* and *Coastal Strategy* documents are due for completion by December 2019. The *Marine and Coastal Act 2018* has nine objectives including the need to protect and enhance marine and coastal environments, to acknowledge and engage with traditional owners, to manage coastal hazards and risks including impacts of climate change, and to take a sustainable approach to the use of marine and coastal resources. The Act also contains seven guiding principles including the need for integrated and ecosystem-based management.

Key reforms are directed at better integration. This is to be achieved by three mechanisms. First, regional coastal boards have been abolished and their responsibilities transferred to broader coastal catchment boards. Second, a new independent Marine and Coastal Council (MACC) has been created to advise on the development of the statewide coastal policy and an action oriented coastal strategy which will now be signed off by all relevant ministers. The previous coastal strategy, a statutory document, was prepared by the former VIC Coastal Council and then signed off by the environment minister. The new policy and strategy will be prepared internally by government with advice from the MACC and signed off by the relevant minister. Third, the Act also provides for the creation of regional and strategic partnerships.

A major reform is the deliberate integration of catchment with coastal and marine planning and management. The Act now requires the development of environmental and coastal and marine management plans, including a framework for marine spatial planning. To complement the Act the government released a *Marine and Coastal Reforms Final Transition Plan* (2018) to identify policy reforms and on ground actions needed as the new system is implemented. There is also a provision for the DELWP to provide support in addressing coastal erosion and flooding. The amount of funding support for the coastal reforms package is unclear although Parks Victoria which manages around 70% of the VIC coastline plus all its marine protected areas received AU\$70.6 million in the 2018/19 state budget over four years plus AU\$20 million ongoing in operational funding.

Table 2
Recent (post 2010) coastal reforms in Australia.

State	Coastal reform	Key influences
WA	2013 Hazard Policy WA	2007 IPCC 4AR
QLD	2012 Coastal Plan	2007 IPCC 4AR
	2014 Coastal Plan	2012–2015 Changing political ideologies
	2016 <i>QCoast2100</i>	- Local Government Association of QLD
	2016 Climate Change Strategy	2004 Australian 'seachange'
NSW	2016 <i>Planning Act</i> (active 2017)	population movement
	2016 <i>Coast Management Act</i> (active 2018)	2007 IPCC 4AR
	2016 Coastal Reform funding package	2009 National parliamentary inquiry into coastal management and climate change
	2018 Coastal Council	- Legal cases over coast protection and sea-level rise benchmarks
	2018 Coastal Manual	2007 IPCC 4AR
	2018 SEPP coastal	2014 Victorian National Parks Association
VIC	2018 <i>Marine and Coastal Act</i>	
	2018 Marine & Coastal Committee	
	2019 (pending) Marine & Coastal Strategy	
	2019 (pending) Marine & Coastal Policy	

4. Discussion – the latest wave of Australian coastal management reform

Although Australia in the 1990s went through a wave of coastal management reforms adopting an integrated approach and more sustainable use of coastal resources there were limits to the achievement of goals. Around the nation, reforms did not fully come to grips with effective implementation mechanisms for adaptation to climate change, or a true systems-based approach to coastal processes and, nor did reforms achieve integration across the coastal and marine divide. The need for better integration and for more effective adaptation to climate change in coastal management was made clear by three national reports [16–18] which set the stage for the wave of 21st Century coastal reform in Australia. Given the absence of national coastal legislation or coastal policy, these reforms have been initiated by individual states primarily three eastern mainland coastal states (QLD, NSW and VIC) plus WA. The three eastern states introduced coastal management reform through their dedicated coastal legislation and policies while WA introduced coastal management reform through its planning legislation (Table 2).

Birch and Reyes [1] in their study of the international scientific literature identify a notable shift from the use of 'coastal zone management' to 'integrated coastal management' (ICM) but this is not the case in Australia where integrated coastal zone management' ICZM is often used to distinguish the coast from 'integrated catchment management' with the same acronym. The goal of integration is clearly stated in the objects and guidelines of the 2018 pieces of coastal legislation introduced in NSW and VIC, albeit the mechanisms for achieving integration are different in each state.

Achieving the goal of integrated coastal management is often hindered by a variety of factors and timing of their influence. This has been described as the 'combination-lock effect' which can block integrated coastal zone management [10]. This blocking effect can involve local community, industry or non-government pressure groups in addition to the three tiers of Australian governments plus international influences. The timing and/or alignment of these influences is often critical in reaching agreed coastal policy outcomes.

The need to incorporate the potential impacts of climate change and sea-level rise into coastal risk and hazard assessment was problematical in its implementation for various reasons. The earliest Australian state to create a sea-level rise policy was SA in 1991 but the policy could not be implemented until it was incorporated into the SA planning

regulations containing the head-powers for statutory development control on the coast. In QLD, political instability affected the timing of climate change policy implementation but when the reforms were finally re-introduced in 2016, the state found it necessary to set up a special support fund, *Q2coast100*, to provide financial assistance to local government for the preparation of their local hazard strategies. In NSW, in 2012 the sea-level rise benchmark policy was withdrawn because of difficulties with its implementation. The policy was later incorporated in NSW's new legislation in keeping with a more holistic approach to the development of CMPs. Financial assistance was made available for the preparation of CMPs through the NSW Coasts and Estuaries grant program. Difficulties experienced in implementing coastal climate change reforms in three states with specific coastal legislation indicated a need for strong integration between coastal and planning legislation in each state.

It is important to note that many of the coastal policy reforms are influenced or at least obtain feedback through various coastal conferences. The national biennial 'Coast to Coast' conferences run by the *Australian Coastal Society* had significant federal involvement in the early years (see Ref. [10]; pages 19–25). There are also a number of state coastal conferences, the most influential of which has been the annual NSW conference run for the last 27 years with very strong state and local government representation.

Birch and Reyes [1] noted a change in the focus of coastal management studies (1975–2014) to cross-boundary management strategies and a consideration of both marine and terrestrial environments. Australian coastal reforms since 2010 demonstrate a clear move to manage across boundaries and integrate marine and terrestrial coastal management as evidenced in NSW where one of the objects of the *Coastal Management Act 2016* is to support the objects of the *Marine Estate Management Act 2014*. The VIC coastal legislation is quite specific in its intended integration in the title of its legislation *Marine and Coastal Act 2018*. The VIC legislation has replaced coastal boards with cross-boundary catchment management boards and also specifies the development of environmental and coastal and marine management plans and a framework for marine spatial planning.

The shift in recent international coastal management literature toward a systems perspective [1] is reflected in Australian coastal reforms in different ways. In WA the coastal policy and hazard risk guidelines specify the need for any coastal development to be considered in context of coastal cells or sediment compartments. The use of these in coastal management requires an understanding of physical geomorphic processes, sediment supply, and future hazards and risks incorporating the impacts of climate change [25]. The NSW legislation incorporates an understanding of different types of coast, different types of coastal hazards, recognizes the dynamic and ambulatory nature of coastal boundaries and in Schedule 1 of its new Act identifies and names all NSW sediment compartments. In addition, the coastal manual provides detailed guidance on identifying the interactive nature of coastal processes. For these reasons, the NSW reforms are probably the most advanced in Australia in terms of adopting a systems perspective. The VIC legislation is less specific about a systems approach although more details may be produced in the forthcoming marine and coastal strategy and plan documents due for release at the end of 2019.

The use of sediment compartments in management will be more difficult in those areas which lack information on sediment movement. For this reason, Thom et al. [25] have contributed to a national on-line system of coastal adaptation using expert judgement to provide interim data until more detailed sediment studies become available.

It will be interesting to see if the recent reforms will act as a stimulus for revised coastal legislation or policy in other states. In SA, which has the oldest piece of coastal legislation (1972) there was a formal review conducted in 1992, along with a government green paper but no action eventuated. In 2004 the SA *Living Coast Strategy* [27] promised the development of a new Coast and Marine Act but again nothing has happened. Since then new SA planning legislation,

containing head-powers for coastal management has been passed and there is a need to better define the operational linkages between the new planning and the older coastal legislation.

In TAS the state-wide statutory coastal policy of 1996 has been subject to a formal public review process since 2013 and is still technically under review. In the NT where Aboriginal people own and manage around 80% of the coast there has been very little action on coastal policy by the NT government until 2018 when it released a discussion paper outlining a proposed state-wide coastal and marine management strategy. At the time of writing, this strategy had not been finalized.

5. Conclusion

This paper has demonstrated that although there has been a lack of federal leadership in Australian coastal management, there have been major state-based coastal reforms starting in the 1990s which attempted to produce a more integrated and sustainable coastal management approach incorporating potential impacts of climate change. Given this process involved separate state and territory governments, rather than the federal government, this resulted in significant variation in coastal legislation and policy across the country. The mixed success of the 1990s reforms can be attributed in part to the nature of the implementation mechanisms adopted and the complex linkages between coastal legislation and policy and planning and development control in the respective states.

The most recent wave of 21st Century reform to both coastal legislation and policy has been led by a number of the state governments largely in response to significant international reports. The nature of these Australian coastal reforms is fairly consistent with many of the global trends in coastal management identified from the scientific literature, such as cross-boundary management strategies, a consideration of both marine and terrestrial environments, and adoption of a systems perspective.

There has been a clear push for better integration in coastal management although the trend toward usage of the term ICM has not occurred in Australia. Attempts to achieve horizontal integration between state government coastal and marine management agencies, legislation and policy is evident primarily from new coastal legislation introduced in NSW and VIC in 2018. Similarly, these jurisdictions have attempted to achieve spatial integration across the coastal and marine sectors. What is lacking however is a broader agenda for national integration in coastal management.

It is likely that other states will carefully monitor the recent reforms introduced by NSW and VIC as they review or create their own policies. For example, SA with the oldest coastal legislation in the country has previously indicated a desire for coastal legislative reform but has so far failed to find a mechanism or structure to implement such reform. It may learn from reforms in the east coast states of QLD, NSW and VIC which like SA all have various forms of linkages between their specific coastal legislation and their planning and development regulations.

Given the 21st Century reforms discussed in this paper have only been introduced since 2010 and new coastal legislation came into effect from 2018, it will take time to assess the effectiveness of the practical application of these changes. In particular, these new strategies and policies need to prove themselves in the light of anticipated changes likely to take effect at the coast with rising sea levels, increased vulnerability and ongoing development demand.

Declarations of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.marpol.2019.02.016>.

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